ANNUAL REPORT 1965

MEAFORD

water treatment plant

DIVISION OF PLANT OPERATIONS
Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Meaford Local Advisory Committee,
Town of Meaford.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Meaford Water Treatment Plant, OWRC Project No. 59-W-29.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water treatment.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE CHAIRMAN

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Meaford Water Treatment Plant, OWRC Project No. 59-W-29.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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MEAFORD
water treatment plant

operated by

THE TOWN OF MEAFORD

and by the

ONTARIO WATER RESOURCES COMMISSION

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VICE-CHAIRMAN: J. H. H. Root, M.P.P.

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D. A. Moodie — L. E. Venchiarutti

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F. A. Voege — A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: A. Clark

801 Bay Street Toronto 5

'65 REVIEW

The total plant output in 1965 was 417.641 million gallons, an increase of 9.45% over the plant output for 1964. This is an indication of the trend since 1962, when flow data from the present plant was first received. During this time there has been no significant change in population.

Demand is such that during summer months there are occasions when the diesel high lift pump must be run to supplement the electrically driven one. This occurs when the demand exceeds a 1.6 mgd rate.

The per capita demand in 1965 was 300 gpd.

It was first felt that consideration should be given to increasing the electrically driven pumping facilities, but further examination of the available information indicated that the per capita consumption, even excluding industry, was far too high. A study of the distribution system should be undertaken.

During 1965, 72 bacteriological samples were taken in the Town of Meaford of these 12 showed positive results. Of the 12 positive results only 1 was taken from the system, the others were raw water samples.

GLOSSARY

BTU	British Thermal Unit
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpm	gallons per minute
lin. ft.	linear feet
mgd	million gallons per day
pH	a symbol for hydrogen-ion concentration; a pH test determines the intensity of the acidity or alkalinity of a water
ppm	parts per million
ss	suspended solids
SWD	side wall depth
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)
turbidity	a measurement of the amount of visible material in suspension in water

HISTORY
1957 - 1965

In 1957, the Town of Meaford and the Ontario Water Resources Commission initiated plans for the construction of a modern water treatment plant. The firm of Phillips and Roberts Limited, Consulting Engineers of Burlington, Ontario was engaged to prepare plans and specifications for the project.

APPROVAL

In March 1959, the municipality signed an agreement with the Ontario Water Resources to finance, construct, and operate a water treatment plant.

CONSTRUCTION

Pearce Construction Company Limited was awarded the contract and the project was officially opened on August 23, 1961.

TOTAL COST

The total cost of the project was $483,129.09.

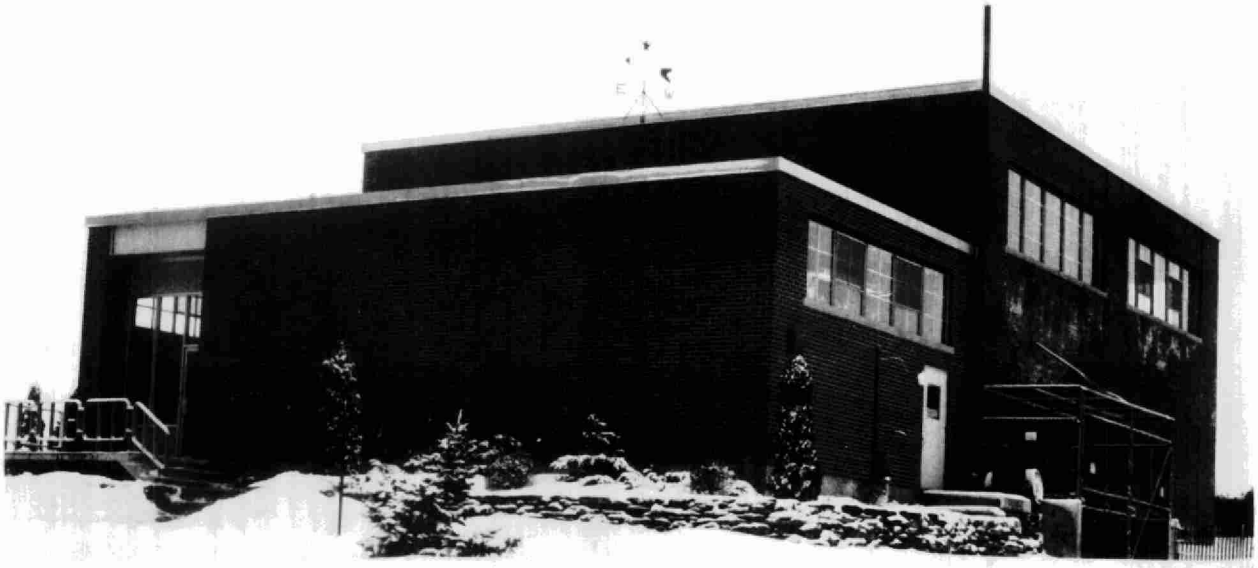
MURRAY COOK

Project Staff

COMMENTS

The Meaford Water Treatment Plant and the water supply system are operated by the Meaford Public Utilities Commission. The man responsible for the operation is Murray Cook.

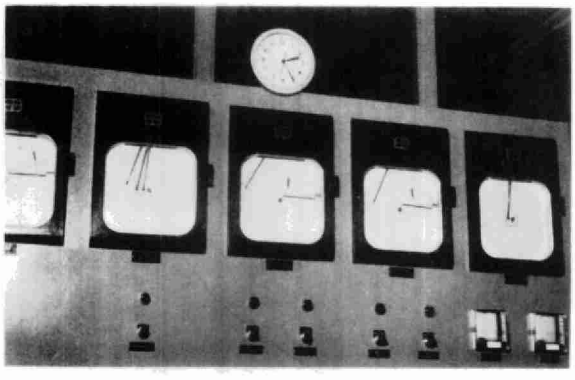
Mr. Cook has operated the plant since 1961. In February 1963, he completed the Ontario Water Resources Commission course for Water Works Operators. His operation of the plant has been most satisfactory.



Description of Project

GENERAL

Meaford Water Treatment Plant consists of a 30 inch gravity water intake 870 ft. long, low lift pumping station, filtration plant, clear water reservoir, high lift pumping station, and 6000 ft. of 16 inch transmission main from the high lift pumping station to the center of the existing distribution system.



CONTROL PANEL

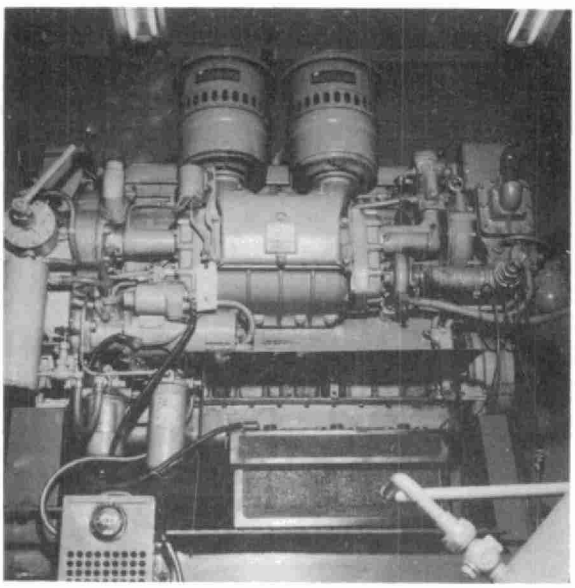
INTAKE

The gravity intake line delivers raw water from Georgian Bay to the intake well where it is pumped by two 2100 IGPM vertical turbine Fairbanks-Morse pumps, to the filtration plant. The raw water is chlorinated in the low lift transmission main before it reaches the filter

beds. The filter beds are 25 feet square and contain graded anthrafilt which is supported on a Miller Block underdrain system. The rated capacity of each filter is 1.5 mgd and can accomodate 2.0 mgd for short periods of time should the need arise.

FILTER CONTROL

The filter control valves are all hydraulically operated by means of four way valves in each filter operating console located on the operating floor. The filters are backwashed by using a vertical propeller type pump with a capacity of 6500 IGPM. The backwashing cycle is performed to remove the foreign materials which have been filtered from the water.



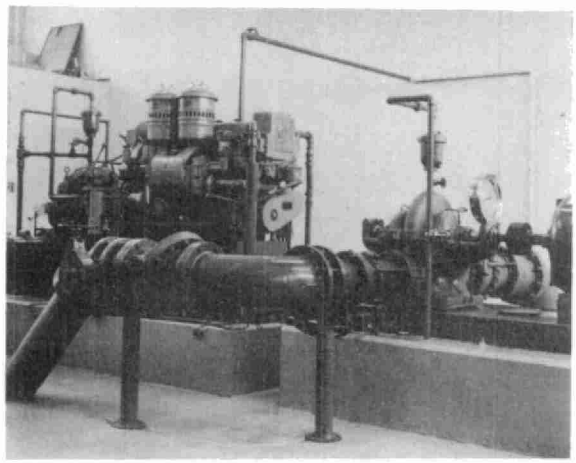
ABOVE IS A CLOSE-UP OF HIGH LIFT PUMP NO. 2. THIS IS THE AUXILIARY DIESEL PUMP THAT MUST BE STARTED MANUALLY. AT RIGHT, IT IS SHOWN BESIDE THE ELECTRIC LINE PUMP (PUMP NO. 1).

PUMPING

The filtered water is stored below the filtration plant and pumping station in a clear water reservoir which has a capacity of 200,000 gallons. The filtered water is pumped from the reservoir by two horizontal centrifugal pumps with a combined capacity of 2600 IGPM and are located in the high lift pumping station.

CONTROL PANEL

The entire operation of low lift pumping, filtration, chlorination, backwashing, and high lift pumping is controlled by a central control panel located in the main office in the high lift pumping station. The operation of each essential component of the water system is indicated and recorded on the central panel and a visual inspection will indicate if the plant operation is satisfactory.



PROJECT COSTS

NET CAPITAL COST (Final) Long Term Debt to OWRC	$483,129.09
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	$ 72,909.45
Net Operating	$ 12,915.00
Debt Retirement	12,822.00
Reserve	2,945.11
Interest Charged	27,106.98
TOTAL	$ 55,789.09

RESERVE ACCOUNT

Balance at January 1, 1965	$ 15,421.05
Deposited by Municipality	2,945.11
Interest Earned	915.96
	$ 19,282.12
Refund of Expenditures	(15.43)
Balance at December 31, 1965	$ 19,297.55

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN										
FEB	1730.77	299.44			393.91				3.00	1034.42
MARCH	510.83									510.83
APRIL	1631.66	654.84			836.97	103.13		3.59	5.53	17.60
MAY										
JUNE	4020.45	800.60			775.32			841.31	78.95	1524.27
JULY	28.25							28.25		
AUG	1999.33	586.23			1051.67	103.13		179.17	75.20	3.93
SEPT	491.51	298.10			32.97	103.13			55.81	1.50
OCT	669.90	318.87			283.05				66.38	1.70
NOV	750.60	430.43			311.27			(5.39)	12.66	1.63
DEC	1081.70	338.43			313.12			244.63	153.16	32.36
TOTAL	12915.00	3726.94			4008.28	309.39		1291.56	450.59	3128.24

BRACKETS INDICATE CREDIT

THE TWO HIGH SUNDRY ITEMS WERE TAXES AND INSURANCE.

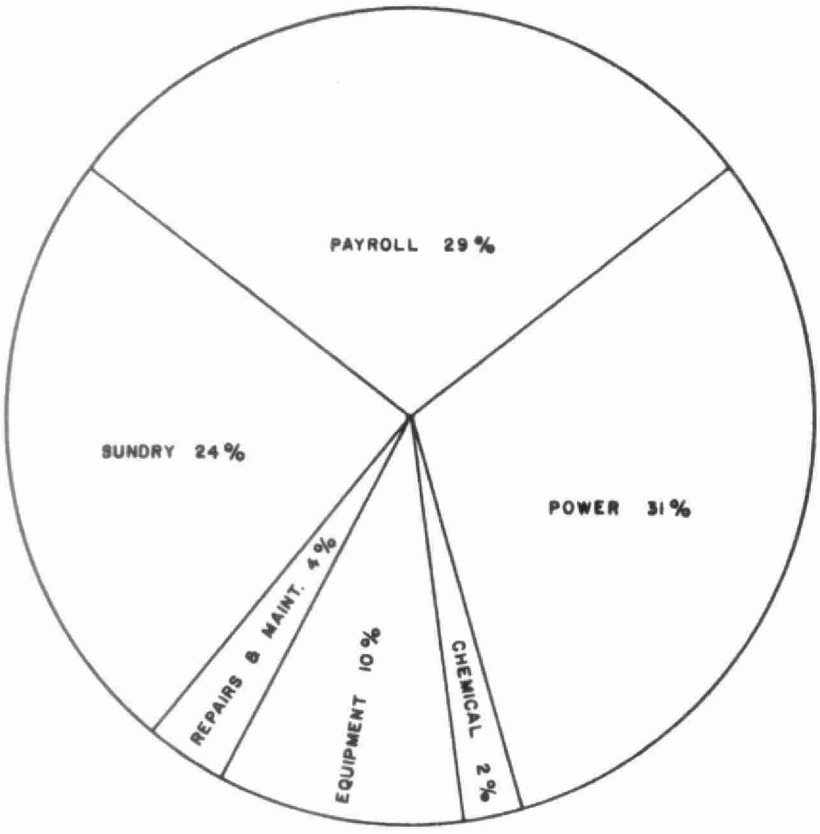
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER THOUSAND GALLONS
1964	381.236	$ 11,793.29	* $ 11.97	$ 0.03
1965	417.641	$ 12,915.00	$ 13.10	$ 0.03

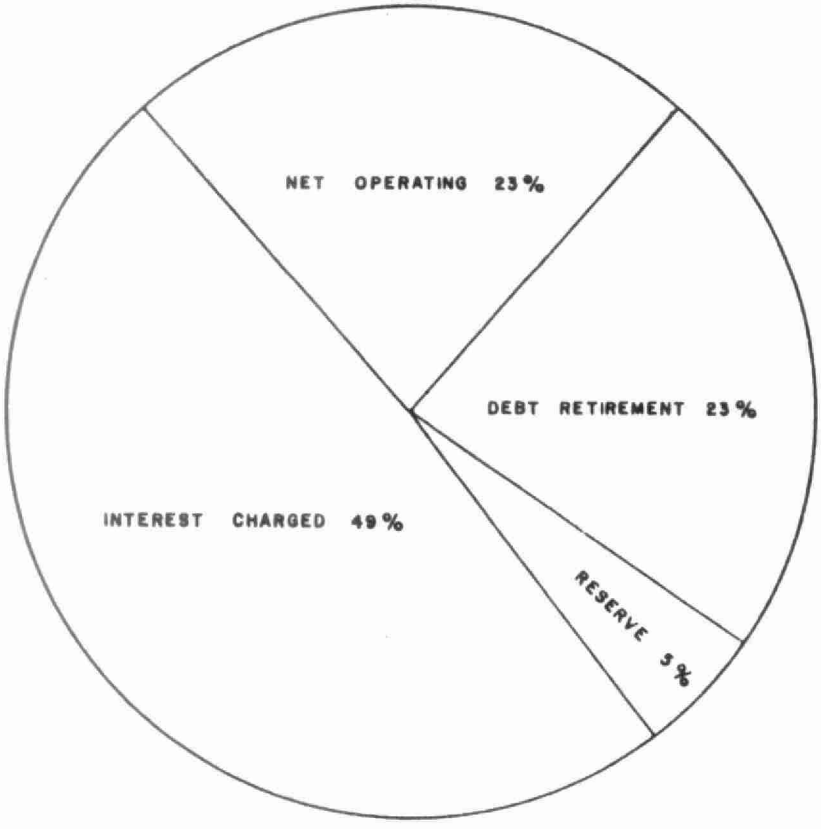
* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

THERE WAS AN INCREASE IN THE COST PER FAMILY DURING 1965 BECAUSE ALTHOUGH PUMPAGE INCREASED THE POPULATION DID NOT.

1965 OPERATING COSTS

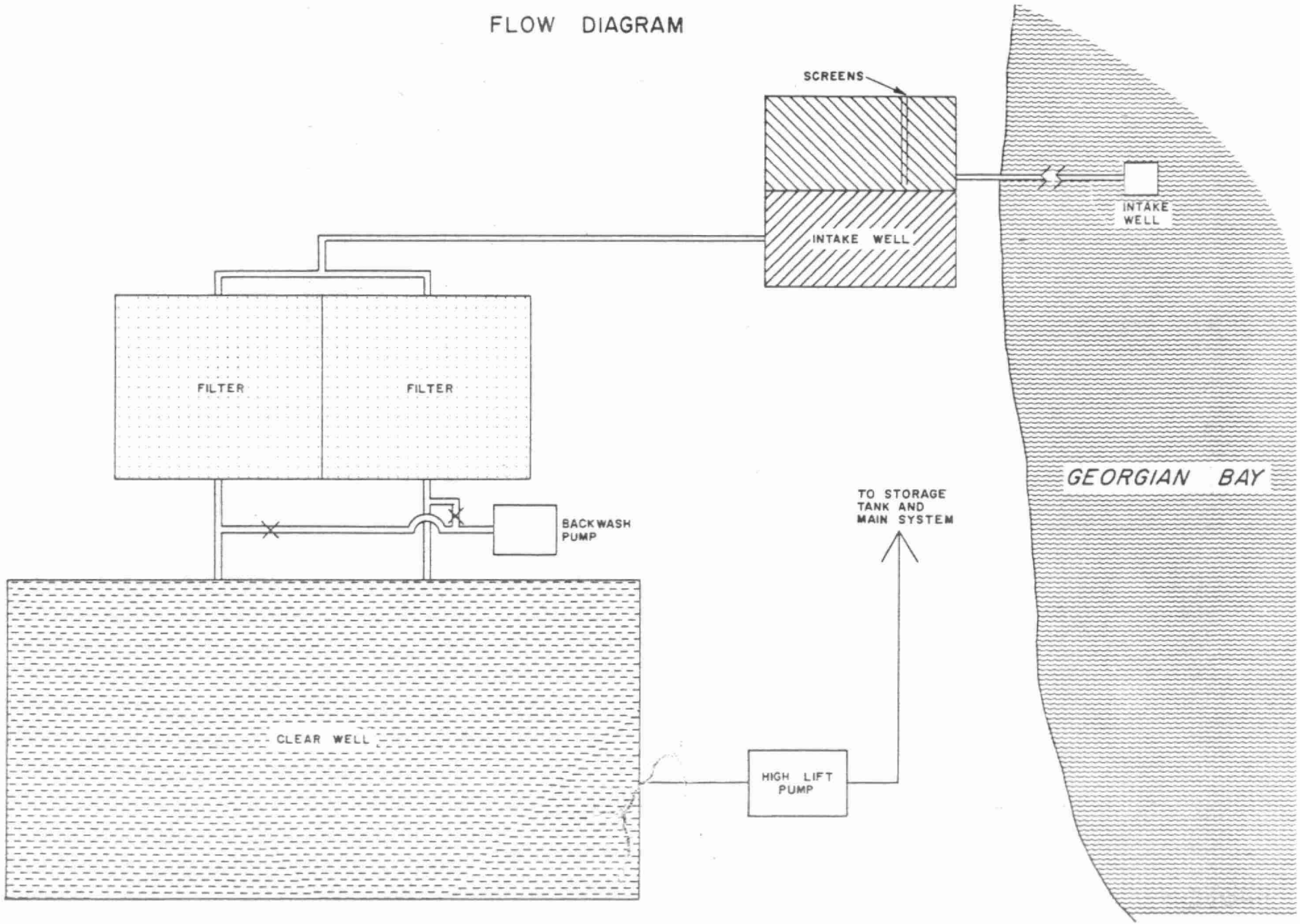


TOTAL ANNUAL COST



Technical Section

FLOW DIAGRAM



Design-Data

GENERAL

Type of Plant - Rapid sand filter

Source of Raw Water - Georgian Bay

INTAKE

Size 30 inches
Length - 850 feet
Depth of water at intake head - 20 ft.
Type of Pipe - Hyprescon Reinforced concrete.

LOW LIFT PUMPS

Number 2
Capacity Low Lift Pump No. 1 - 2100 IGPM
Low Lift Pump No. 2 - 2100 IGPM
Total Capacity - 4200 IGPM
Operating Head - 50 feet
Type - Vertical turbine
Manufacturer - Canadian Fairbanks-Morse
Auxiliary Power - Low Lift Pump No. 2, Chrysler Industrial Engine.

HIGH LIFT PUMPS

Number 2
Capacity - High Lift Pump No. 1 - 1170 IGPM
High Lift Pump No. 2 - 2000 IGPM
Total Capacity - 2600 IGPM
Operating Head - High Lift Pump No. 1 172 feet
High Lift Pump No. 2 - 180 feet
Type - Centrifugal
Manufacturer - High Lift Pump No. 1 - Fairbanks-Morse.

High Lift Pump No. 2 - Delaval
Auxiliary Power - High Lift Pump No. 2 G. M. C. Diesel.

BACKWASH PUMP

Number 1
Capacity - High Lift Pump No. 1 6500 IGPM
Operating Head - 38 feet
Type - Propelled
Manufacturer - Canadian Fairbanks-Morse.

CHLORINATOR

Number 1
Type - Chlorine Gas
Manufacturer - Fisher Porter
Range - 0 to 20 and 0 to 40 pounds per day.

FILTERS

Number 2
Size - 25 feet x 25 feet
Nominal Capacity - 1.5 MIGD each
Total Capacity - 3.0 MIGD
Filter Media - graded anthrafilt underdrains
Surface Wash - Palmer agitators.

CLEARWELL RESERVOIR

Capacity - 200,000 Imperial Gallons.

Process Data

FLOWS

The average daily flow for the Meaford Water Treatment Plant in 1965 was 1.141 million gallons per day. This represents an increase of 36 million gallons or 9.45% over 1964. During 1965 the average flow represented 76% of design flow. The design flow of 1.6 mgd was exceeded 1% of the time during 1965 on a daily basis.

In order to pump in excess of design flows the plant was forced to start up auxiliary pumping.

Other significant figures derived were:

1. The 6pm-6am demand, omitting the major industrial consumers, was 58 gallons per capita.

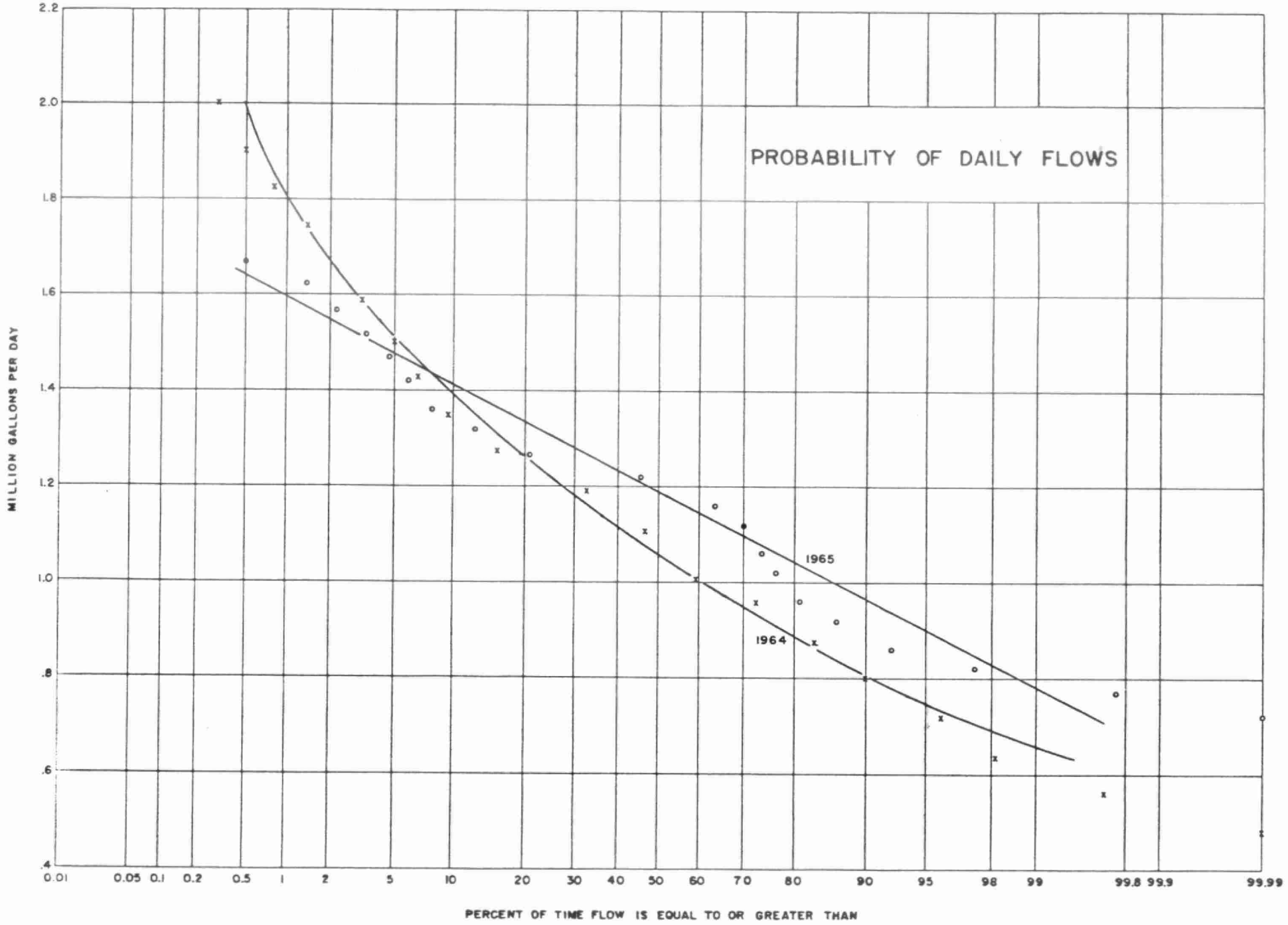
2. The maximum demand in June and July of 1964/65 was as follows:

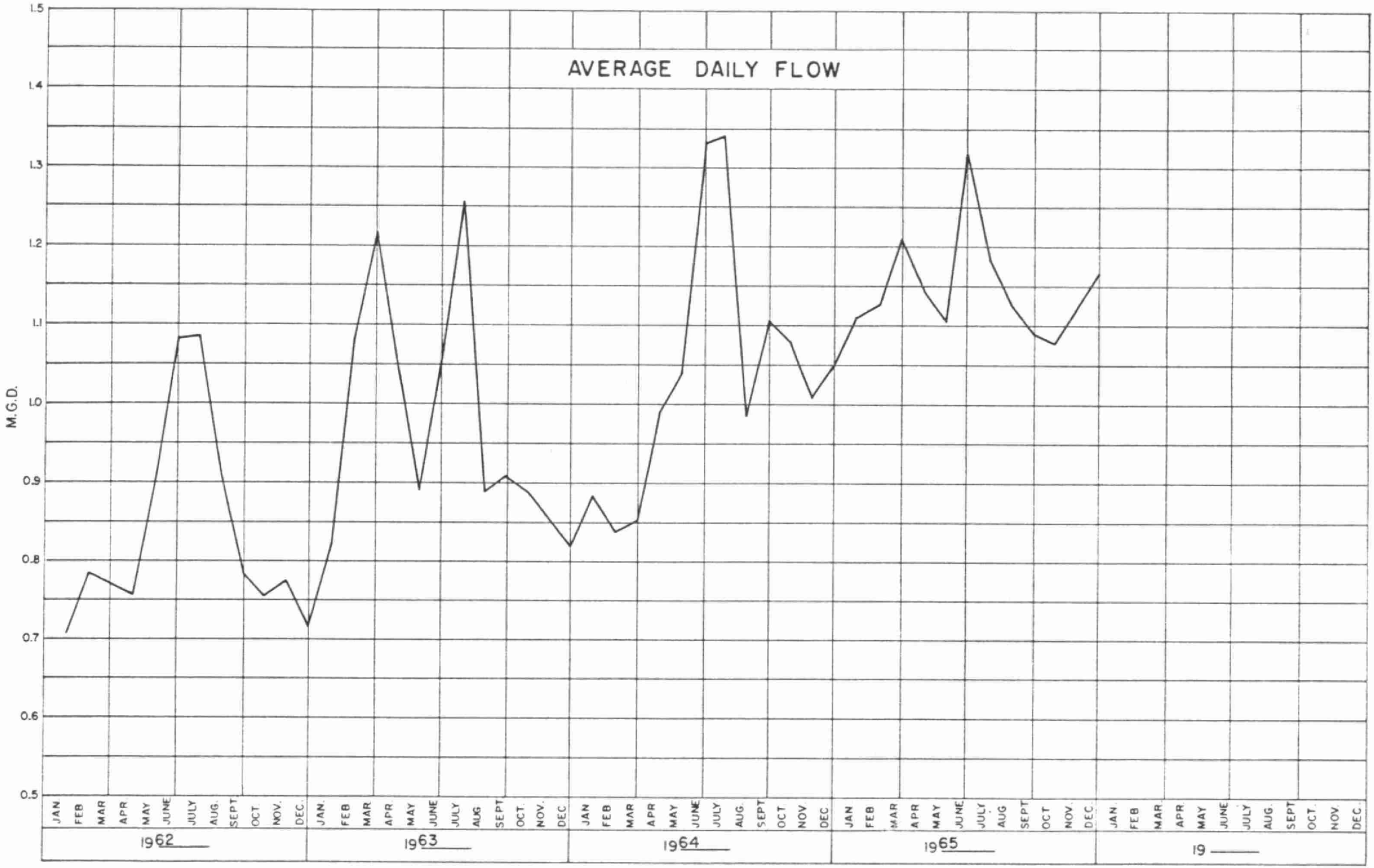
	June	July
1964	346gpcd	349gpcd
1965	346	311

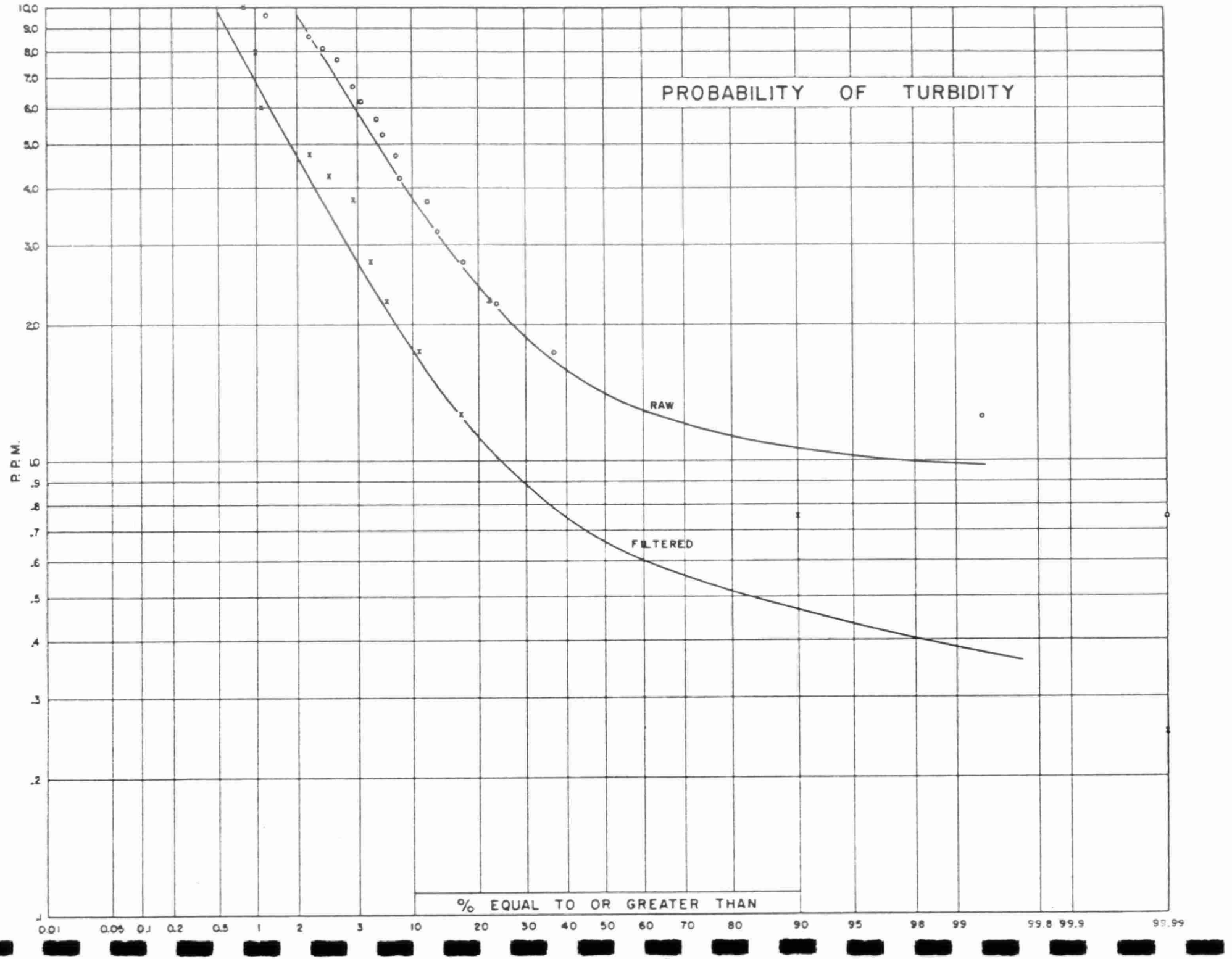
3. The electrically driven high lift pump ran 49% of the time in 1962 and it is predicted that it will run 71% of the time in 1966.

4. Since 1962 the consumption has increased by 45%, the population by 2%.

This information read in conjunction with the graphs on Pages 21 and 22 indicates the need for a "leak" survey of the distribution system.


PROBABILITY OF DAILY FLOWS
MILLION GALLONS PER DAY
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
1965
1964
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT OF TIME FLOW IS EQUAL TO OR GREATER THAN


AVERAGE DAILY FLOW
M.G.D.
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1962
JAN. FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV. DEC.
1963
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV DEC.
1964
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV. DEC.
1965
JAN. FEB MAR. APR. MAY JUNE JULY. AUG. SEPT OCT. NOV. DEC.
19


PROBABILITY OF TURBIDITY
RAW
FILTERED
P.P.M.
% EQUAL TO OR GREATER THAN
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

TURBIDITY

MONTH	RAW WATER	FILTERED WATER
January	2.5	1.4
February	2.5	2.0
March	1.5	1.0
April	2.4	1.3
May	1.5	1.0
June	1.5	1.0
July	1.6	1.0
August	2.3	1.0
September	2.3	.7
October	3.1	1.2
November	3.6	1.3
December	2.8	1.0

COMMENTS

Average turbidities of raw and treated water in 1965 on a monthly basis were respectively 2.3 ppm and 1.15 ppm. Average turbidity reduction for the year was 50%. It should be noted that during times of high turbidity percentage removal is generally good while low raw water turbidities are less affected by treatment.

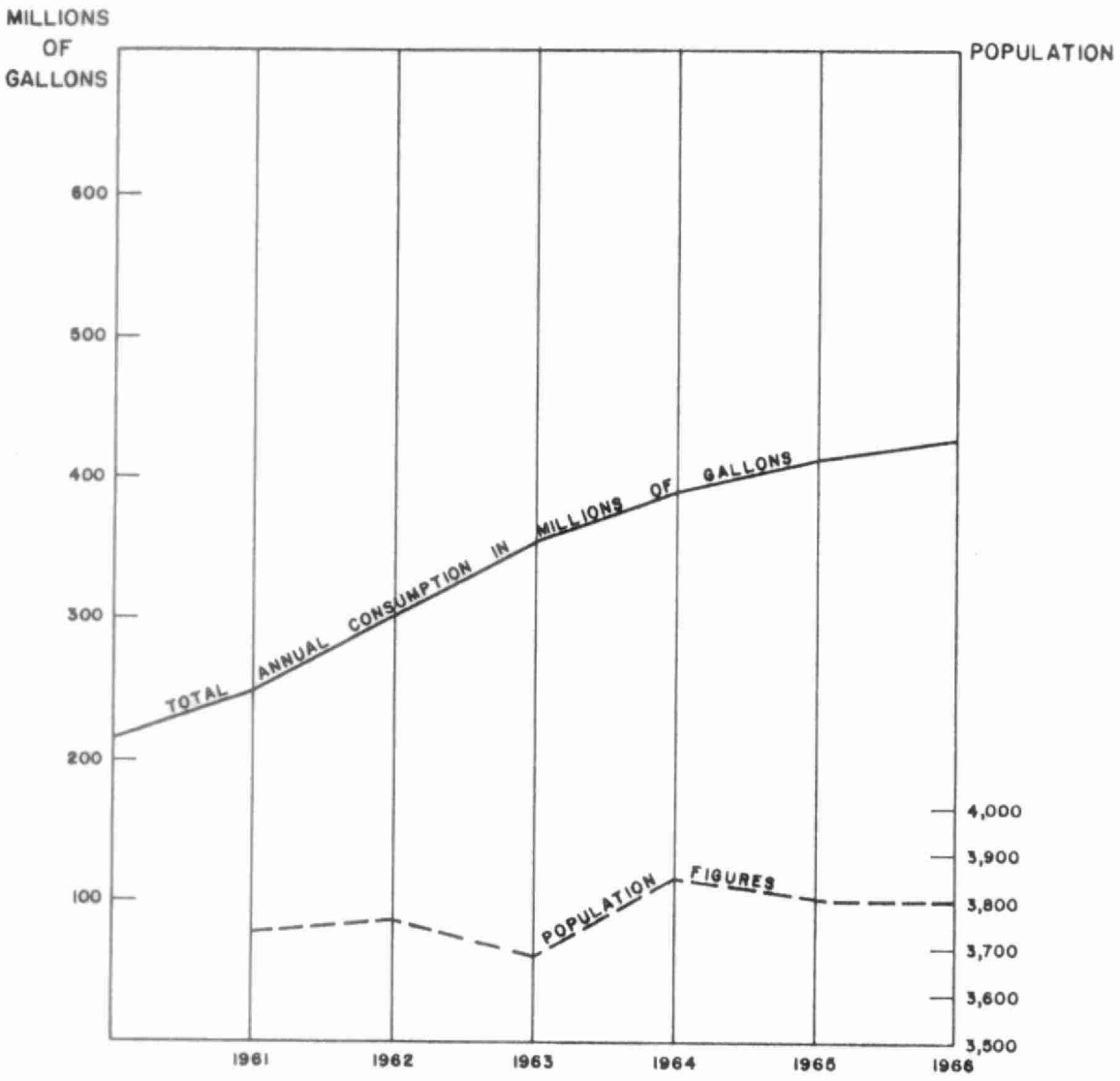
OWRC turbidity objectives are 5 ppm for filtered water.

From the probability graph, it may be seen that the turbidity of treated water exceeded OWRC standards 1.8% of the time.

In addition, the amount of turbidity in the treated water was 1ppm or less 80% of the time.

WATER CONSUMPTION

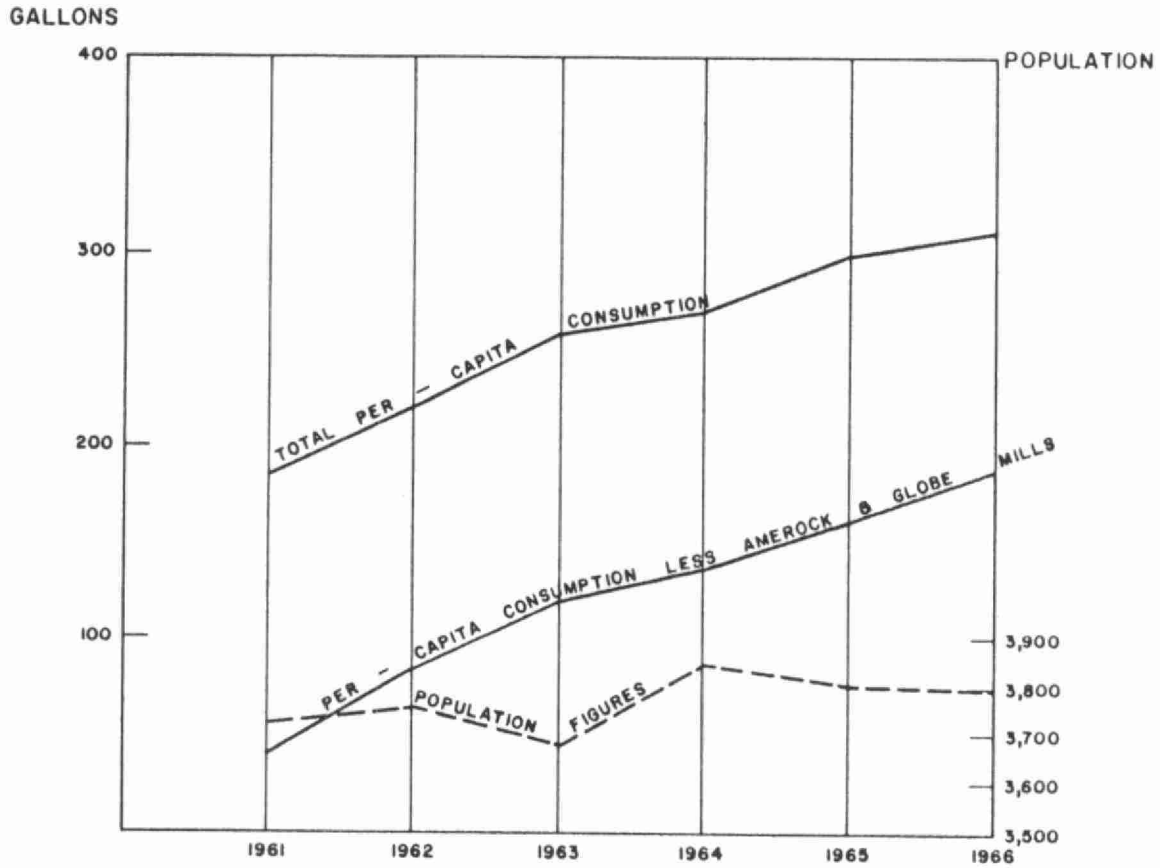
FIG. 1



(1966 PRO — RATED ON 3 MONTHS FLOW)

PER CAPITA CONSUMPTION

FIG. 2



(1966 PRO — RATED ON 3 MONTHS FLOW)

Graph at left (Fig. 1) shows the increase in annual consumption from 1961 with a projection for 1966.

The steepness of the curve resembles the per capita consumption graph above.

Industry is metered in Meaford. When this metered amount is deducted the domestic demand is in excess of 150 gpcd, a figure considerably above average.

CHEMICAL RESULTS

RAW WATER CONCENTRATIONS IN PPM

DATE	HARDNESS as Ca CO_3	ALKALINITY as Ca CO_3	IRON as Fe	CHLORIDE as Cl	pH at LAB.
Jan 25	88	76	0.10	7	8.2
Feb 22	90	94	0.06	9	8.2
Mar 29	90	78	0.14	trace	7.9
Apr 26	90	76	0.04	10	8.3
May 31	90	74	0.04	7	8.2
Jun 29	92	78	0.12	6	8.4
Jul 27	90	74	0.19	6	8.3
Aug 30	94	73	0.50	5	8.2
Sept	90	76	0.04	6	8.2
Nov 3	102	74	0.10	6	8.2
Nov 29	96	76	0.05	6	8.2
Dec 28	90	75	0.15	8	8.4
OWRC OBJECTIVES			0.3	250.0	

COMMENTS

As may be seen from the above chart the chemical characteristics of Georgian Bay are generally excellent and do not vary greatly during the course of a year.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	34.377	251.5	0.73
FEBRUARY	31.450	222.2	0.71
MARCH	37.508	238.0	0.63
APRIL	34.315	236.5	0.69
MAY	34.300	249.0	0.72
JUNE	39.467	311.5	0.79
JULY	36.681	298.0	0.81
AUGUST	34.942	274.0	0.78
SEPTEMBER	32.698	241.0	0.74
OCTOBER	33.312	242.5	0.73
NOVEMBER	33.592	241.0	0.72
DECEMBER	34.999	250.5	0.72
TOTAL	417.641	3055.7	-
AVERAGE	34.803	254.6	0.73

COMMENTS

Chlorine is used to ensure that no pathogenic bacteria remain in the treated water.

Chlorine dosage for the year of 1965 was 0.72 ppm. This was required to maintain the minimum chlorine residual in the treated water of 0.3 ppm. In order to obtain this residual 3055.7 pounds of chlorine were used.

CONCLUSIONS

The Meaford Water Treatment Plant treated 417,641,000 gallons of water during 1965. In order to treat this amount it was required to utilize stand-by pumping. At no time was the filter capacity of the plant exceeded.

RECOMMENDATIONS

An effort should be made to find the cause of seemingly excess water consumption. If the cause can be found and the situation readily rectified, the present pumping facilities are adequate.

A firm capable of conducting a water loss survey of the system should be engaged.


ONTARIO WATER RESOURCES COMMISSION